

Study of the Genus *Urophora* Robineau-Desvoidy (Diptera: Tephritidae) in North Western Provinces of Iran

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Khaghaninia, S., Gharajedaghi, Y. & Mohamadzade Namin, S. Study of the Genus *Urophora* Robineau-Desvoidy (Diptera: Tephritidae) in North Western Provinces of Iran. Summary. Based on specimens collected from East Azerbaijan and West Azerbaijan Provinces during 2009–2011, sixteen species of the genus *Urophora* (Tephritidae) are recognized to occur in these regions. *U. stalker* Korneyev and *U. variabilis* (Loew) are recorded for the first time from Iran. In addition, *Carduus thoermeri armenus* is recorded as a new host plant for *U. solstitialis* (Linnaeus). A key to species of the genus *Urophora* occurring in Ardabil, East Azerbaijan and West Azerbaijan Provinces is provided.

Key words: Tephritidae, *Urophora*, Iran, new records.

Хаганиния С., Гараджедаги Я. и Мохамадзаде Намин С. Изучение рода *Urophora* Robineau-Desvoidy (Diptera: Tephritidae) в северо-западных провинциях Ирана. Резюме. На основании материала из провинций Восточный Азербайджан и Западный Азербайджан в 2009–2011 гг. установлено, что в регионе встречаются 16 видов рода *Urophora* (Tephritidae). *U. stalker* Korneyev и *U. variabilis* (Loew) впервые отмечены из Ирана. Кроме того, *Carduus thoermeri armenus* отмечается как новое кормовое растение *U. solstitialis* (Linnaeus). Составлена таблица для определения видов рода *Urophora*, встречающихся в провинциях Ардабил, Восточный и Западный Азербайджан.

Ключевые слова: Tephritidae, *Urophora*, Иран, новые находки.

Хаганія С., Гараджедагі Я. і Мохамадзаде Намин С. Вивчення роду *Urophora* Robineau-Desvoidy (Diptera: Tephritidae) в північно-західних провінціях Ірану. Резюме. На підставі матеріалу з провінцій Східний Азербайджан і Західний Азербайджан в 2009–2011 рр. встановлено, що в регіоні зустрічаються 16 видів роду *Urophora* (Tephritidae). *U. stalker* Korneyev і *U. variabilis* (Loew) вперше відзначено з Ірану. Крім того, *Carduus thoermeri armenus* відзначається як нове кормова рослина *U. solstitialis* (Linnaeus). Складено таблицю для визначення видів роду *Urophora*, що зустрічаються в провінціях Ардабїл, Східний і Західний Азербайджан.

Ключові слова: Tephritidae, *Urophora*, Іран, нові знахідки.

Introduction

The genus *Urophora* Robineau-Desvoidy, 1830, with about 60 species, is one of the largest genera of the family Tephritidae in the Palearctic Region (Norrbom *et al.*, 1999). All species of known biology are associated with asteraceous plants and induce galls in their host plants and some of them are potential agents to biological control of astraceous weeds (White & Korneyev, 1989).

There are three provinces (Ardabil, East Azerbaijan and West Azerbaijan) in north western part of Iran. Before this study, Mohamadzade Namin *et al.* (2010) recorded *Urophora phaeocera* (Hering), *U. quadrifasciata sjumorum* Rohdendorf, *U. solstitialis* (Linnaeus) and *U. terebrans* (Loew) from Ardabil Province. Gharajedaghi *et al.* (2011) recorded *U. affinis* (Frauenfeld), *U. impicta* (Hering), *U. jaceana* Hering, *U. quadrifasciata* (Meigen)

and *U. solstitialis* from Ajabshir region (south west of East Azerbaijan Province), of them *U. affinis* and *U. jaceana* are misidentification of *U. pauperata* (Zaitzev) and *U. terebrans* respectively. Later, Karimpour (2011) recorded *U. aprica* (Fallén), *U. pauperata*, *U. quadrifasciata sjumorum*, *U. sirunaseva* (Hering), *U. solstitialis*, *U. stylata* (Fabricius) and *U. xanthippe* (Munro) from West Azerbaijan Province.

Material and methods

Materials are collected by standard sweeping net and rearing from flower heads of asteraceous plants during 2009–2011. Species were identified according to Korneyev & White (1992, 1993, 1994, 1996, 1999). Collected specimens are deposited at Insect Museum of Tabriz University (IMTU) and the third author's personal collection.

The responsibilities are distributed between the authors as follows: YG, SK and SMN collected the specimens, YG and SK wrote the manuscript and SMN recognized the species, wrote the key, edited the manuscript and prepared the illustrations.

Results

In this study, sixteen species of the genus *Urophora* were collected in East Azerbaijan and West Azerbaijan provinces. Of them, *U. stalker* Korneyev and *U. variabilis* (Loew) are recorded for the first time from Iran. In addition, *Carduus thoermeri armenus* recorded as new host plant for *U. solstitialis*. The species are listed in alphabetic order. Detailed morphological descriptions are not given. For further information, refer to the works Korneyev & White (1992–1999) and for host plants refer to Korneyev & White (2000).

Key to the species of the genus *Urophora* occurring in Ardabil, East Azerbaijan and West Azerbaijan provinces

- 1 Wing hyaline, without crossbands 2
- Wing with 3–4 well-developed crossbands 4
- 2 Smaller: $WL_{\text{♀}} < 3.8$, $AL < 2.5$, $WL_{\text{♂}} < 3.6$; associated with *Acroptilon repens* *U. xanthippe*
- Larger: $WL_{\text{♀}} > 4.1$, $AL > 3.5$, $WL_{\text{♂}} > 3.4$; associated with *Cousinia* 3
- 3 All femora black in basal part *U. hermonis*
- All femora yellow, only fore femora striped black dorsally *U. impicta*
- 4 Mesonotal scutum shining black *U. quadrifasciata sjumorum*
- Mesonotal scutum covered with gray microtomentum 5
- 5 All femora black in basal part 6
- All femora yellow 9

- 6 First segment of flagellum yellow *U. aprica*
- First segment of flagellum black 7
- 7 Aculeus with 2 pairs of distinct preapical steps *U. variabilis*
- Aculeus without any distinct preapical step 8
- 8 Width of discal crossband at the level of r–m crossvein equal or lesser than length of r–m *U. repeteki*
- Width of discal crossband at the level of r–m crossvein exceeding length of r–m *U. phaeocera*
- 9 Notopleura yellow *U. stalker*
- Notopleura mostly black 10
- 10 Subbasal crossband lacking or present as darkening near bm and bcu cells 11
- Subbasal crossband well developed 13
- 11 Preapical and apical crossbands connected in anterior margin of the wing *U. stylata*
- Preapical and apical crossbands separated by hyaline interspace 12
- 12 Larger: $WL_{\text{♀}} > 4.1$, $AL > 3.5$; associated with *Centaurea* (subgenus *Calcitrapa*) *U. pauperata*
- Smaller: $WL_{\text{♀}} < 3$, $AL < 2.5$; associated with *Centaurea* (subgenus *Acrolophus*) *U. affinis*
- 13 Aculeus with one pair of preapical steps, aculeus tip pointed without notch; associated with *Carthamus* *U. mauritanica*
- Aculeus tip with notch or with 2 pairs of preapical steps; not associated with *Carthamus* 14
- 14 Distance between primary and secondary aculeus steps equal to width of aculeus apex *U. sirunaseva*
- Distance between primary and secondary aculeus steps greater than width of aculeus apex 15
- 15 Aculeus apex between primary and secondary steps broad with notch at apex; associated with *Centaurea* *U. cuspidata*
- Aculeus apex between primary and secondary steps normal; not associated with *Centaurea* 16
- 16 Distance between primary and secondary aculeus steps greater than width of aculeus apex at the level of primary steps; associated with *Carduus* *U. solstitialis*
- Distance between primary and secondary aculeus steps less than width of aculeus apex at the level of primary steps; associated with *Onopordum* and *Cirsium* *U. terebrans*

List of species

Urophora affinis (Frauenfeld, 1857)

Material examined. West Azerbaijan: Ziveh, 10 km W Ziveh, 37°08'N, 44°52'E, 2630 m, 25.08.2011, 2 ♂, 1 ♀ (SMN).

Distribution. Throughout Europe from Spain to Russia except Scandinavian countries, Iran and North America (Norrbom *et al.*, 1999; Merz & Korneyev, 2004).

Urophora cuspidata (Meigen, 1826)

Material examined. East Azerbaijan: Ajabshir, 37°31'N, 46°01'E, 1750 m, 27.06.2010, 1 ♀ (YG).

Distribution. Throughout Europe, Russia (Norrbom *et al.*, 1999; Merz & Korneyev, 2004) and Iran (Mohammadzade Namin *et al.*, 2011).

Urophora hermonis Freidberg, 1974

Material examined. East Azerbaijan: Ajabshir, 37°33'N, 45°58'E, 1788 m, 09.08.2010, 1 ♀ (YG).

Distribution. Israel and Iran (Norrbom *et al.*, 1999).

***Urophora impicta* (Hering, 1942)**

Material examined. East Azerbaijan: Ajabshir, Huri, 37°32'N, 45°50'E, 1750 m, 01.04.2010, 1 ♀ (YG); West Azerbaijan: Ziveh, 10 km W Ziveh, swept on *Cousinia* sp., 37°08'N, 44°52'E, 2630 m, 25.06.2011, 23 ♂, 10 ♀ (SMN).

Distribution. Russia, Armenia, Iran, Turkmenistan and Afghanistan (Norrbom *et al.*, 1999; Korneyev & White, 1999; Merz & Korneyev, 2004; Gharali *et al.*, 2008).

***Urophora mauritanica* Macquart, 1851**

Material examined. East Azerbaijan: Arasbaran, 38°57'N, 47°17'E, 1444 m, 30.06.2009, 3 ♂, 4 ♀ (SK); Ajabshir, 37°32'N, 45°50'E, 1750 m, 28.04.2010, 1 ♂, 1 ♀ (YG).

Distribution. Throughout Europe from Spain to Russia except Scandinavian countries, Turkey, Israel, Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, North Africa (Korneyev & White, 1999; Merz & Korneyev, 2004) and Iran (Gharali *et al.*, 2004).

***Urophora pauperata* (Zaitzev, 1945)**

Material examined. East Azerbaijan: Ajabshir, 37°30'N, 45°59'E, 1525 m, 5.06.2009, 2 ♂, 2 ♀ (YG); Arasbaran, 38°51'N, 46°52'E, 1770 m, 20.06.2009, 4 ♂, 5 ♀ (SK); Kandovan, 37°44'N, 46°19'E, 2900 m, 18.08.2010, 3 ♂, 2 ♀ (SK); Maragheh, 37°25'N, 46°25'E, 1787 m, 25.06.2010, 5 ♂, 4 ♀ (YG); Sahand ski resort, 30 km to Tabriz, 37°45'N, 46°30'E, 2900 m, 30.08.2010, 1 ♂; Kaleibar, 12.07.2010, 1 ♂ (SMN); West Azerbaijan: Urmieh, 5 km N Silvana, 26.6.2011, 1 ♂, 3 ♀ (SMN).

Distribution. Egypt, Turkey, Georgia, Armenia, Azerbaijan, Kazakhstan, Kirghizia, Uzbekistan, Turkmenistan, Tajikistan (Norrbom *et al.*, 1999; Korneyev & White, 1999) and Iran (Karimpoor, 2006).

***Urophora phaeocera* (Hering, 1961)**

Material examined. East Azerbaijan: Ajabshir, 37°28'N, 45°53'E, 1750 m, 15.07.2009, 3 ♂, 1 ♀ (YG); Isperkhan, 37°46'N, 46°24'E, 2504 m, 08.08.2009, 1 ♂ (SK); Kaleibar, reared from flower heads of *Cousinia* sp., date of collecting: 12.07.2010, date of exit: 30.07.2010, 1 ♂, 1 ♀ (SMN).

Distribution. Turkey, Armenia, Azerbaijan, Middle East, Syria, Jordan (Norrbom *et al.*, 1999; Korneyev & Dirlbek, 2001) and Iran (Gilasian & Merz, 2008).

***Urophora quadrifasciata sjumorum* Rohdendorf, 1934**

Material examined. East Azerbaijan: Ajabshir, Mehrab, 37°32'N, 45°50'E, 1750 m, 01.04.2010, 1 ♂, 1 ♀.

Distribution. Cyprus, Turkey, Armenia, Azerbaijan, Uzbekistan, Turkmenistan, Tajikistan, Kazakhstan, Kirghizia, Israel, Pakistan, China (Norrbom *et al.*, 1999; Korneyev & White, 1999) and Iran (Karimpoor, 2006).

***Urophora repeteki* (Munro, 1934)**

Material examined. East Azerbaijan: Mianeh, 37°28'N, 47°32'E, 1275 m, 24.05.2010, 1 ♀ (SK).

Distribution. Cyprus, Turkey, Israel, Iran, Kazakhstan, Uzbekistan, Kirghizia, Turkmenistan, Tajikistan and Afghanistan (Norrbom *et al.*, 1999; Korneyev & White, 1999).

***Urophora sirunaseva* (Hering, 1938)**

Material examined. East Azerbaijan: Shahyurdi, 37°31'N, 47°51'E, 1684 m, 03.06.2010, 1 ♀ (SK).

Distribution. Greece, Crete, Turkey, Hungary, Moldova, Ukraine, Israel, Italy, Azerbaijan (Norrbom *et al.*, 1999; Merz & Korneyev, 2004) and Iran (Karimpoor, 2011).

***Urophora solstitialis* (Linnaeus, 1758)**

Material examined. East Azerbaijan: Kaleibar, reared from flower heads of *Carduus thoermeri armenus* (new host plant), date of collecting: 12.07.2010, date of exit: 27.07.2010, 4 ♂, 2 ♀ (SMN).

Distribution. Throughout Europe from Spain to Russia, Turkey, Armenia, Iran, Kazakhstan, Kirghizistan and W China (Korneyev & White, 1999; Merz & Korneyev, 2004).

***Urophora stalker* Korneyev, 1984 (Figs 1, 3)**

Material examined. East Azerbaijan: Ajabshir, 37°31'N, 46°07'E, 1469 m, 24.07.2010, 1 ♀ (YG).

Distribution. Tajikistan, Kazakhstan, Uzbekistan, Kirghizistan and Turkmenistan (Korneyev & White, 1999). **New record for Iran.**

Diagnosis. Wing with 4 brown crossbands. Subbasal and discal crossbands widely separated in anterior margin of the wing. Preapical and apical crossbands narrowly connected in cell r_1 (Fig. 1). Mesonotal scutum covered with gray microtomentum. Femora and antenna yellow. Notopleura yellow. Aculeus with two pairs of distinct preapical steps (Fig. 3).

***Urophora stylata* (Fabricius, 1775)**

Material examined. East Azerbaijan: Arasbaran, 38°53'N, 46°48'E, 1859 m, 20.06.2009, 1 ♂ (SK); Ajabshir, 37°30'N, 46°01'E, 1437 m, 13.07.2010, 1 ♂, 1 ♀ (YG); Hashtrod, 37°26'N, 46°06'E, 1545 m, 24.07.2010, 1 ♂ (YG).

Distribution. Throughout Europe from Spain to Russia (incl. Siberia), Turkey, Israel, Kazakhstan, Kirgizstan, Western China, Pakistan, India, North America, Australia (Norrbom *et al.*, 1999; Korneyev & White, 1999; Merz & Korneyev, 2004) and Iran (Karimpoor, 2006).

***Urophora terebrans* (Loew, 1850)**

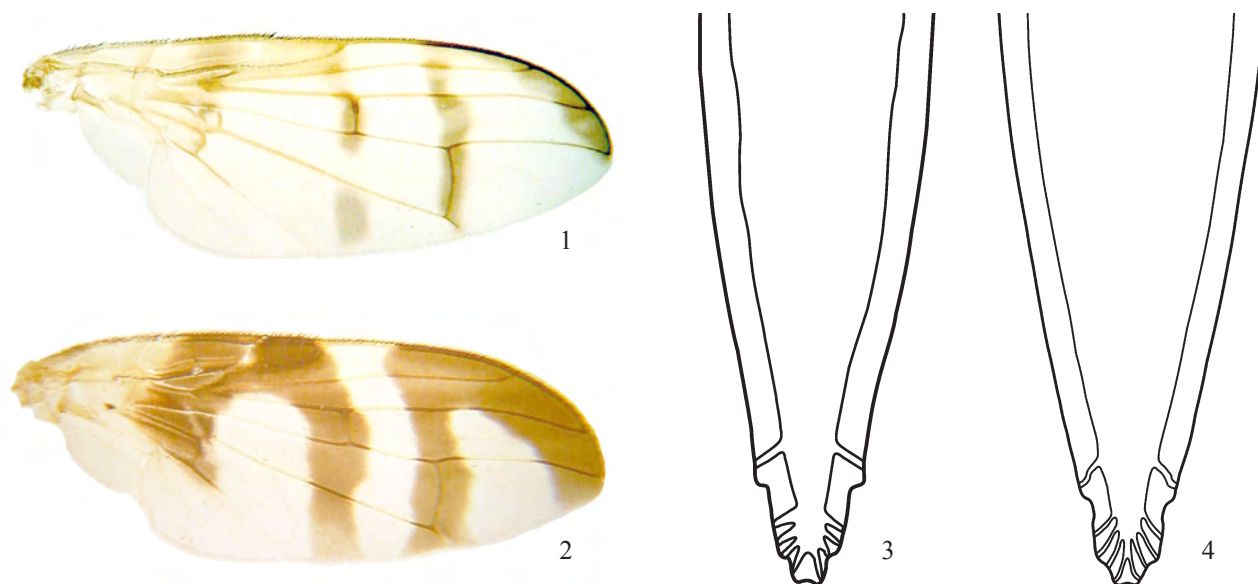
Material examined. East Azerbaijan: Chichakli, 38°39'N, 46°31'E, 2140 m, 01.08.2009, 4 ♀ (YG); Ajabshir, 37°29'N, 45°52'E, 1320 m, 24.05.2009, 3 ♀ (YG); Hashtrod, 38°23'N, 47°09'E, 1510 m, 24.07.2009, 2 ♀ (SK); Ajabshir, 37°28'N, 45°49'E, 1660 m, 13.07.2010, 2 ♂ (YG); Kaleibar, reared from flower heads of *Onopordum heterocanthum*, date of collecting: 12.07.2010, date of exit: 29.07.2010, 4 ♂, 6 ♀ (SMN).

Distribution. Throughout Europe from Spain to Ukraine except Scandinavian countries, Turkey, Armenia, Azerbaijan (Korneyev & White, 1999; Merz & Korneyev, 2004) and Iran (Mohamadzade Namin *et al.*, 2010).

***Urophora variabilis* (Loew, 1869) (Figs 2, 4)**

Material examined. East Azerbaijan: Ajabshir, 37°29'N, 45°52'E, 1320 m, 5.06.2009, 4 ♂, 5 ♀ (YG); West Azerbaijan: Ziveh, 10 km W Ziveh, 37°08'N, 44°52'E, 2630 m, 24.07.2011, 2 ♂, 4 ♀ (SMN).

Distribution. Greece, Moldova, Ukraine, Russia, Georgia and Turkmenistan (Korneyev & White, 1999; Merz & Korneyev, 2004). **New record for Iran.**



Figs 1–4. *Urophora*, wing (1–2) and apex of aculeus (3–4): 1, 3 — *Urophora stalker*; 2, 4 — *U. variabilis*.

Diagnosis. First flagellomere black, mesonotal scutum covered with gray microtomentum, notopleura black, femora, except apical, black; wing with 4 dark brown crossbands. Subbasal and discal crossbands widely connected in anterior margin of the wing. Preapical and apical crossbands connected in cells r_1 and r_{2+3} (Fig. 2). Aculeus with two pairs of distinct preapical steps (Fig. 4).

Urophora xanthippe (Munro, 1934)

Material examined. East Azerbaijan: Mianeh, 37°31' N, 47°21' E, 1482 m, 03.06.2010, 1 ♀ (YG).

Distribution. Ukraine, Kazakhstan, Turkmenistan, Tajikistan, Afghanistan, Uzbekistan (Korneyev & White, 1999) and Iran (Karimpour, 2006).

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